

## **ATTACHMENT 7**

### **MOBILE 6 Sample Calculations**

### **Sample Calculations for I/M SIP**

An EPA recommended model (MOBILE 6) was used to estimate emission factors for different vehicle types, speed ranges, and pollutants. This model considers many variables, such as summer day temperatures and regional fuel characteristics. This model also predicts emission factors given a particular vehicle inspection program.

A traffic network model was developed for the St. Louis ozone maintenance area by EWGCC (East West Gateway Coordinating Council). This model predicted traffic flows for about nine thousand individual roadway links. This model not only estimated the amount of summer weekday traffic, but traffic speeds as well. The traffic network was evaluated for three regimes – a.m. peak, p.m. peak, and off peak.

Eight vehicle types were studied;

- Light duty gasoline vehicles,
- Light duty gasoline trucks types one and two,
- Light duty gasoline trucks type three and four,
- Heavy duty gasoline vehicles,
- Light duty diesel vehicles,
- Light duty diesel trucks,
- Heavy duty gasoline trucks, and
- Motorcycles.

Emissions for each link were calculated as follows:

$$V_{mix_1}[(VMT_{am})(Ef_{am})+(VMT_{pm})(Ef_{pm})+(VMT_{op})(Ef_{op})]=EM_1$$

where:

$VMT_{am}$  = Daily vehicle miles traveled on the link during the a.m. peak (miles/day)

$VMT_{pm}$  = Daily vehicle miles traveled on the link during the p.m. peak (miles/day)

$VMT_{op}$  = Daily vehicle miles traveled on the link during off-peak times (miles/day)

$V_{mix_1}$  = Percentage of vehicle type 1 traffic (fraction)

$Ef_{am}$  = Emission factor of vehicle type 1 at a.m. peak speed (g/mile)

$Ef_{pm}$  = Emission factor of vehicle type 1 at p.m. peak speed (g/mile)

$Ef_{op}$  = Emission factor of vehicle type 1 at off-peak speed (g/mile)

$EM_1$  = Emissions from vehicle type 1 (g/day)

The emissions from each of the eight vehicle types were then summed for each link.

$$\sum EM_x = EM = \text{Total link emissions}$$

This calculation was done for the pollutants VOC, CO, and  $NO_x$ .

The enhanced Inspection and Maintenance program VOC reduction calculation will take into account reformulated gasoline fuel. It will not take into account purge and full pressure testing, as no such testing is currently feasible. It will not take into account clean screening because MOBILE 6 is not yet capable of modeling this customer convenience element. These VOC reductions will meet or exceed the basic performance standard and nearly meet the enhanced performance standard in July 2003 as the following table demonstrates.

**Composite Emission Factor at 19.6 Miles Per Hour**

| <b>Type of Program</b>                   | <b>VOC (gpm)</b> | <b>CO (gpm)</b> | <b>NO<sub>x</sub> (gpm)</b> |
|--|------------------|-----------------|-----------------------------|
| <b>No I/M Controls</b>                   | 1.45             | 15.91           | 2.54                        |
| <b>EPA Basic Performance Standard</b>    | 1.38             | 15.04           | 2.53                        |
| <b>Missouri I/M Program</b>              | 1.26             | 13.42           | 2.41                        |
| <b>EPA Enhanced Performance Standard</b> | 1.22             | 13.24           | 2.39                        |